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EXAMINER				
HOLLWEG, THOMAS A				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/573,518

Applicant(s)

SONG ET AL.

Examiner

Thomas A. Hollweg

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 and 21-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 and 21-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 12/15/08.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Acknowledgement of Amendment

1. Applicant's Amendment, received October 14, 2008, is acknowledged. No claims are added. Claim 20 is cancelled. Claims 1-19 and 21-24 are currently pending.
2. The objection to the drawings for not showing the claimed subject matter of claim 20 is withdrawn because claim 20 has been canceled.
3. Claims 3, 7, 23 and 11 have been amended to correct minor informalities. The objections to claims 3, 7, 23 and 11 are therefore withdrawn.
4. Amendments to claim 10 are acknowledged. The 35 U.S.C. § 112, second paragraph, rejection of claim 10 is withdrawn.
5. The Terminal Disclaimer has been accepted, overcoming the obviousness-type Double Patenting rejection of claims 1-7 and 11-24 over claims 1-15 of U.S. Patent No. 7,176,615. The Double Patenting rejections are therefore withdrawn.
6. Applicant's arguments have been considered but are moot in light of new grounds for rejection.

Information Disclosure Statement

7. The information disclosure statement (IDS) submitted on December 15, 2008, is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Objections

8. The following claims are objected to because of the following informalities:

- a. In claim 1, the phrase "a field emission-inducing gate portion formed on top of the field emission-suppressing gate portion surrounding the field emitter" is unclear because it cannot be determined whether the field emission-inducing gate portion is surrounding the field emitter, or the field emission-suppressing gate portion is surrounding the field emitter.
 - b. Claim 10 refers to the "penetrating hole" of claim 1 as the "penetration hole."
 - c. Claims 11 and 15, the notation "--an--" and "--the--" are not in compliance with 37 CFR 1.121 regarding claim markings in amended claims.
 - d. Claim 11, the "penetrating hole of the metal mesh" has not been described in the cathode portion or in the anode portion. It has been described in the field emission-inducing gate portion. This phrasing is confusing.
 - e. Claim 15, it is not clear whether the electrons referenced in the phrase "pixels defined by the electrodes" of line 4, are the cathode electrodes, the field emission-suppressing gate electrodes or both.
 - f. Claim 15, "the field emission-suppressing gate of the cathode portion" of line 8, lacks antecedent basis. It appears that the cathode portion has field emission-suppressing gate electrodes, but not a field emission-suppressing gate.
 - g. Claim 15, "the field emission-inducing gate portion" of line 11, lacks antecedent basis.
- Appropriate correction is required.

Claim Rejections - 35 USC § 112, First Paragraph

9. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

10. Claims 15-19 and 21-24 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

11. Amended claim 15, lines 6 and 7 now read "a field emission-suppressing gate portion formed on top of the field emission-suppressing gate portion." This claim now describes a second field emission-suppressing gate portion formed on top of a first field emission-suppressing gate portion. This configuration is not described in the original disclosure.

Claim Rejections - 35 USC § 112, Second Paragraph

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. Claims 15-19 and 21-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
14. Amended claim 15, lines 6 and 7 now read "a field emission-suppressing gate portion formed on top of the field emission-suppressing gate portion." It is unclear

whether applicant intended that there is a second field emission-suppressing gate portion formed on top of a first field emission-suppressing gate, or the field emission-suppressing gate portion has two parts with one on top of the other, or some other meaning. Because the meaning of this limitation cannot be determined the claim will be treated as consistent with the pre-amended claim which did not include a field emission-suppressing gate portion formed on top of the field emission-suppressing gate portion.

15. Amended claim 15, lines 9 and 10, says that the insulator is "in the form of surrounding the field emitter that surrounds electrons being emitted from the field emitter." It is unclear what additional limitation or clarification is intended by the new clause added by amendment. If the insulator was in the form of surrounding the field emitter, as specified by the original version of the claim, it would have inherently surrounded electrons being emitted from the field emitter during the operation of the device. Therefore, the new clause added by amendment does not appear to add any meaning to the claim, nor does it appear to clarify the claim.

Claim Rejections - 35 USC § 102

16. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

17. Claims 1, 2, 4-6, 8-18, 21, 22 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Janning, U.S. Patent No. 5,955,833.

18. With regard to claim 1, in figure 2, Janning discloses a field emission device (10') comprising: a cathode portion having a substrate (30'), a cathode electrode (22') formed on the substrate (30'), and a field emitter (12') connected to the cathode electrode (22'); a field emission-suppressing gate portion (26') formed on the cathode portion around the field emitter (12') and surrounding the field emitter (12'); and a field emission-inducing gate portion (26a) formed on top of the field emission-suppressing gate portion (26') surrounding the field emitter (12') having a metal mesh (26a) with at least one penetrating hole (28a) that surrounds electrons (29') being emitted from the field emitter (12'), and a dielectric layer (40a) formed on at least a part of the metal mesh (26a), wherein the field emission-suppressing gate portion (26') suppresses electrons from being emitted from the field emitter (12'), and the field emission-inducing gate portion (26a) induces electrons to be emitted from the field emitter (12') (col. 5, line 3 - col. 6, line 11).

19. With regard to claim 2, in figure 2, Janning discloses that the dielectric layer (40a) of the field emission-inducing gate portion (26a) is formed on an entire surface or a portion of the surface of the metal mesh (26a) (col. 5, lines 56-64).

20. With regard to claim 4, in figure 2, Janning discloses that the penetrating hole (28a) of the metal mesh (26a) has at least one inclined inner wall (col. 5, line 64-66).

21. With regard to claim 5, in figure 2, Janning discloses that the dielectric layer (40a) covers the inclined inner wall of the penetrating hole (28a) (col. 5, lines 60-61).

22. With regard to claim 6, in figure 2, Janning discloses that the field emission-suppressing gate portion (26') is electrically insulated (24a) from the field emission-

inducing gate portion (26a), and has an insulator (24') with a field emission-suppressing gate opening (28') therein, and a field emission-inducing gate electrode (26') formed on the insulator (24') (col. 5, lines 19-22).

23. With regard to claim 8, in figure 2, Janning discloses that the inner wall of the metal mesh (26a) includes a protrusion having at least two inclined angles (one on either side of the hole; col. 5, lines 56-64).

24. With regard to claim 9, in figure 2, Janning discloses that the metal mesh (26a) of the field emission-inducing gate portion (26) is a metal plate formed of one of aluminum, iron, copper and nickel, or an alloy plate containing at least one of stainless steel, invar and kovar (col. 5, lines 42-45; col. 5, lines 64-66).

25. With regard to claim 10, in figure 2, Janning discloses that the field emission-suppressing gate portion (26') is divided into a plurality of openings (28'), wherein the penetration hole (28a) of the field emission-inducing gate portion (26a) is one per unit pixel (col. 5, lines 56-66).

26. With regard to claim 11, in figure 2, Janning discloses that a size of the penetrating hole (28a) of the metal mesh (26a) in the cathode portion is larger than that in an anode portion (col. 5, lines 56-66).

27. With regard to claim 12, in figure 2, Janning discloses that the field emitter (12') is formed of a thin or thick film formed of one of diamond, diamond like carbon, carbon nanotube, and carbon nanofiber (col. 3, lines 36-40).

28. With regard to claim 13, the examiner notes that the claim limitation "the filed emitter is formed by directly growing any one of diamond, diamond like carbon, carbon

nanotube, and carbon nanofiber on the cathode electrode using a catalytic metal" is drawn to a process of manufacturing which is incidental to the claimed apparatus. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation has been considered but is not patentably distinct over Janning (See MPEP 21113).

29. With regard to claim 14, the examiner notes that the claim limitation "the field emitter is formed by printing a paste containing any one of powder type diamond, diamond like carbon, carbon nanotube and carbon nanofiber" is drawn to a process of manufacturing which is incidental to the claimed apparatus. It is well established that a claimed apparatus cannot be distinguished over the prior art by a process limitation. Consequently, absent a showing of an unobvious difference between the claimed product and the prior art, the subject product-by-process claim limitation has been considered but is not patentably distinct over Janning (See MPEP 21113).

30. With regard to claim 15, in figure 2, Janning discloses a field emission display device (10') comprising: a cathode portion including cathode electrodes (22') and field emission-suppressing gate electrodes (26') arranged in a stripe form (col. 5, lines 14-15) to allow matrix addressing to be carried out and insulated (24') from each other on a substrate (30'), and pixels defined by the electrodes, each pixel having a field emitter (12') connected to the cathode electrode (22'); a field emission-suppressing gate portion (26') having an insulator (24') with a gate opening in the field emission-suppressing gate of the cathode portion formed on a region around the field emitter (12') in the form of

surrounding the field emitter (12') that surrounds electrons (29') being emitted from the field emitter (12'); a field emission-inducing gate portion (26a) having a metal mesh (26a) with at least one penetrating hole (28a) allowing electrons (29') emitted from the field emitter (12') to pass therethrough, and a dielectric layer (40a) formed on at least a part of the metal mesh (26a); and an anode portion having an anode electrode (16') and a phosphor (18') connected to the anode electrode (16'), wherein the field emission-suppressing gate portion (26') suppresses electrons (29') from being emitted from the field emitter (12'), and the field emission-inducing gate portion (26a) induces electrons (29') to be emitted from the field emitter (12') so that the electrons (29') emitted from the field emitter (12') collide with the phosphor (18') via the penetrating hole (28a) (col. 5, line 3 - col. 6, line 11).

31. With regard to claim 16, in figure 2, Janning discloses that the cathode portion, the field emission-suppressing gate portion (26'), the field emission-inducing gate portion (26a), and the anode portion are vacuum-packaged such that the field emitter (12') of the cathode portion is opposed to the anode electrode (16') of the anode portion via a field emission-suppressing gate opening (28') and the penetrating hole (28a) (col. 4, lines 56-66; col. 5, lines 56-64).

32. With regard to claim 17, examiner notes that the claim limitation "a constant direct current voltage is applied to the field emission-inducing gate portion to induce electron emission from the field emitter of the cathode portion, and a scan signal having a negative voltage is input to the field emission-suppressing gate portion and a data signal having a positive or negative voltage is input to the cathode portion to display an

image" is drawn to a method of operating the claimed field emission display and does not further limit the structure of the device explicitly. The claim limitation has been considered, however, absent a showing that the structure of the device is further limited, this method of operation limitation cannot distinguish the claimed device over the Janning (see MPEP 2114).

33. With regard to claim 18, examiner notes that the claim limitation "a pulse amplitude or a pulse width of the data signal is modulated to represent a gray scale" is drawn to a method of operating the claimed field emission display and does not further limit the structure of the device explicitly. The claim limitation has been considered, however, absent a showing that the structure of the device is further limited, this method of operation limitation cannot distinguish the claimed device over the Janning (see MPEP 2114).

34. With regard to claim 21, in figure 2, Janning discloses that the cathode portion, the field emission-suppressing gate portion (26'), and the field emission-inducing gate portion (26a) are opposed to the anode portion using a spacer (20') as a support (col. 4, line 64).

35. With regard to claim 22, in figure 2, Janning discloses that the dielectric layer (40a) is formed on an entire surface or a part of the surface of the metal mesh (26a) (col. 5, lines 6—61).

36. With regard to claim 24, in figure 2, Janning disclose that the penetrating hole (28a) of the metal mesh (26a) has at least one inclined inner wall (col. 5, lines 56-64).

Claim Rejections - 35 USC § 103

37. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

38. Claims 3, 7 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Janning as applied to claims 1, 6 and 15 above, in view of itself.

39. With regard to claim 3, Janning discloses all of the limitations, except it does not expressly disclose the dimensions of the holes or the thicknesses of the various electrode and insulating layers. One having ordinary skill in the art would understand that the field emission device disclosed by Janning operates based on the electrical fields generated between the various electrodes, and the effectiveness of these fields to create an image is related to the physical dimensions of the electrodes and surrounding layers, including thicknesses of the layers, shape of the electrodes and dimensions of the holes through which the electrons travel. It has been held that where the general limitations of the claim are taught by the prior art, discovering an optimum or workable range involves only routine skill in the art (*In re Aller*, 105 USPQ 233 (CCPA 1955)).

40. Therefore, at the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Janning field emission device where the dimensions of the electrodes and insulators are optimal, such that a largest cross-section of the penetrating hole of the field emission-inducing gate portion is not greater than one time to three times a thickness sum of the metal mesh and the dielectric layer.

41. With regard to claim 7, Janning discloses all of the limitations, except it does not expressly disclose the dimensions of the holes or the thicknesses of the various electrode and insulating layers. One having ordinary skill in the art would understand that the field emission device disclosed by Janning operates based on the electrical fields generated between the various electrodes, and the effectiveness of these fields to create an image is related to the physical dimensions of the electrodes and surrounding layers, including thicknesses of the layers, shape of the electrodes and dimensions of the holes through which the electrons travel. It has been held that where the general limitations of the claim are taught by the prior art, discovering an optimum or workable range involves only routine skill in the art (*In re Aller*, 105 USPQ 233 (CCPA 1955)).

42. Therefore, at the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Janning field emission device where the dimensions of the electrodes and insulators are optimal, such that a largest cross-section of the field emission-suppressing gate opening is one time to twenty times a thickness of the insulator.

43. With regard to claim 23, Janning discloses all of the limitations, except it does not expressly disclose the dimensions of the holes or the thicknesses of the various electrode and insulating layers. One having ordinary skill in the art would understand that the field emission device disclosed by Janning operates based on the electrical fields generated between the various electrodes, and the effectiveness of these fields to create an image is related to the physical dimensions of the electrodes and surrounding layers, including thicknesses of the layers, shape of the electrodes and dimensions of

the holes through which the electrons travel. It has been held that where the general limitations of the claim are taught by the prior art, discovering an optimum or workable range involves only routine skill in the art (*In re Aller*, 105 USPQ 233 (CCPA 1955)).

44. Therefore, at the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Janning field emission device where the dimensions of the electrodes and insulators are optimal, such that a largest cross-section of the field emission-suppressing gate is equal to or smaller than one time to twenty times a thickness of the insulator layer.

45. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Janning as applied to claim 15 above, in view of Ge, U.S. Patent Application Publication No. 2002/0000771 A1.

46. With regard to claim 19, in figure 2, Janning discloses that the anode portion is composed of a transparent substrate (14'), transparent electrodes (16') formed on the transparent substrate (14'), and phosphors (18') (col. 4, lines 56-64) that may be individually addressed (col. 3, lines 64-67).

47. Janning does not expressly disclose that the phosphors are red (R), green (G) and blue (B) colors formed on a predetermined region of each transparent electrode, and a black matrix formed between the phosphors.

48. Ge, in figure 4, discloses a field emission device having an anode portion composed of a transparent substrate (12), transparent electrodes (32) formed on the transparent substrate (12), and phosphors of red (R), green (G) and blue (B) colors (33) formed on a predetermined region of each transparent electrode (32), and a black

matrix formed between the phosphors (33) [0021-0022] so the device may operate as a high contrast full color display for displaying desired images [0009-0010].

49. At the time of invention, it would have been obvious for a person having ordinary skill in the art to construct the Janning field emission device where phosphors of red (R), green (G) and blue (B) colors are formed on a predetermined region of each transparent electrode, and a black matrix is formed between the phosphors so the device may operate as a high contrast full color display for displaying desired images, as taught by Ge.

Conclusion

50. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

51. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

52. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas A. Hollweg whose telephone number is (571) 270-1739. The examiner can normally be reached on Monday through Friday 7:30am-5:00pm E.S.T..

53. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

54. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/TH/

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